

## *Prep for PreCalculus*

This course covers the topics outlined below. You can customize the scope and sequence of this course to meet your curricular needs.

Curriculum (246 topics + 58 additional topics)

- Real Numbers (30 topics)
  - ◆ Fractions (5 topics)
    - ◇ Simplifying a fraction
    - ◇ Using a common denominator to order fractions
    - ◇ Addition or subtraction of fractions with different denominators
    - ◇ Fraction multiplication
    - ◇ Fraction division
  - ◆ Percents and Proportions (8 topics)
    - ◇ Converting between percentages and decimals
    - ◇ Applying the percent equation
    - ◇ Finding the sale price without a calculator given the original price and percent discount
    - ◇ Finding the original price given the sale price and percent discount
    - ◇ Finding simple interest without a calculator
    - ◇ Solving a proportion of the form  $x/a = b/c$
    - ◇ Word problem on proportions: Problem type 1
    - ◇ Word problem on proportions: Problem type 2
  - ◆ Signed Numbers (15 topics)
    - ◇ Integer addition: Problem type 2
    - ◇ Integer subtraction: Problem type 3
    - ◇ Signed fraction addition or subtraction: Basic
    - ◇ Signed fraction addition or subtraction: Advanced
    - ◇ Signed decimal addition and subtraction with 3 numbers
    - ◇ Integer multiplication and division
    - ◇ Signed fraction multiplication: Basic
    - ◇ Signed fraction multiplication: Advanced
    - ◇ Exponents and integers: Problem type 1
    - ◇ Exponents and signed fractions
    - ◇ Order of operations with integers and exponents
    - ◇ Evaluating a linear expression: Integer multiplication with addition or subtraction
    - ◇ Evaluating a quadratic expression: Integers
    - ◇ Absolute value of a number
    - ◇ Operations with absolute value: Problem type 2
  - ◆ Properties of Real Numbers (2 topics)
    - ◇ Identifying numbers as integers or non-integers
    - ◇ Identifying numbers as rational or irrational
- Equations and Inequalities (32 topics)
  - ◆ Linear Equations (20 topics)
    - ◇ Additive property of equality with integers
    - ◇ Multiplicative property of equality with signed fractions
    - ◇ Solving a two-step equation with integers

- ◇ Solving a two–step equation with signed fractions
- ◇ Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution
- ◇ Solving a linear equation with several occurrences of the variable: Variables on both sides and fractional coefficients
- ◇ Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution
- ◇ Solving a linear equation with several occurrences of the variable: Variables on both sides and two distributions
- ◇ Solving a linear equation with several occurrences of the variable: Fractional forms with binomial numerators
- ◇ Solving equations with zero, one, or infinitely many solutions
- ◇ Algebraic symbol manipulation: Problem type 1
- ◇ Algebraic symbol manipulation: Problem type 2
- ◇ Writing a one–step expression for a real–world situation
- ◇ Translating a phrase into a two–step expression
- ◇ Translating a sentence into a one–step equation
- ◇ Solving a word problem with two unknowns using a linear equation
- ◇ Solving a decimal word problem using a linear equation of the form  $Ax + B = C$
- ◇ Solving a value mixture problem using a linear equation
- ◇ Solving a percent mixture problem using a linear equation
- ◇ Solving a distance, rate, time problem using a linear equation
- ◆ Linear Inequalities (9 topics)
  - ◇ Graphing a linear inequality on the number line
  - ◇ Graphing a compound inequality on the number line
  - ◇ Solving a linear inequality: Problem type 1
  - ◇ Solving a linear inequality: Problem type 2
  - ◇ Solving a linear inequality: Problem type 3
  - ◇ Solving a linear inequality: Problem type 4
  - ◇ Solving a compound linear inequality: Graph solution, basic
  - ◇ Solving a compound linear inequality: Interval notation
  - ◇ Solving a decimal word problem using a two–step linear inequality
- ◆ Absolute Value Equations and Inequalities (3 topics)
  - ◇ Solving an absolute value equation of the form  $a|x| = b$  or  $|x| + a = b$
  - ◇ Solving an absolute value equation of the form  $|ax + b| = c$
  - ◇ Solving an absolute value inequality: Basic
- Exponents and Polynomials (44 topics)
  - ◆ Properties of Exponents (13 topics)
    - ◇ Evaluating an expression with a negative exponent: Positive fraction base
    - ◇ Evaluating an expression with a negative exponent: Negative integer base
    - ◇ Rewriting an algebraic expression without a negative exponent
    - ◇ Introduction to the product rule of exponents
    - ◇ Product rule with positive exponents: Multivariate
    - ◇ Product rule with negative exponents
    - ◇ Quotient of expressions involving exponents
    - ◇ Quotient rule with negative exponents: Problem type 1
    - ◇ Introduction to the power rules of exponents
    - ◇ Power rules with positive exponents
    - ◇ Power of a power rule with negative exponents
    - ◇ Power rules with negative exponents
    - ◇ Power and product rules with positive exponents
  - ◆ Scientific Notation (2 topics)
    - ◇ Scientific notation with positive exponent

- ◇ Scientific notation with negative exponent
- ◆ Polynomial Expressions (9 topics)
  - ◇ Degree and leading coefficient of a univariate polynomial
  - ◇ Combining like terms: Advanced
  - ◇ Simplifying a sum or difference of two univariate polynomials
  - ◇ Multiplying a univariate polynomial by a monomial with a positive coefficient
  - ◇ Multiplying a multivariate polynomial by a monomial
  - ◇ Multiplying binomials with leading coefficients of 1
  - ◇ Multiplying conjugate binomials: Univariate
  - ◇ Squaring a binomial: Univariate
  - ◇ Multiplication involving binomials and trinomials in two variables
- ◆ Factoring (9 topics)
  - ◇ Introduction to the GCF of two monomials
  - ◇ Greatest common factor of two multivariate monomials
  - ◇ Factoring out a monomial from a polynomial: Univariate
  - ◇ Factoring out a monomial from a polynomial: Multivariate
  - ◇ Factoring a quadratic with leading coefficient 1
  - ◇ Factoring a quadratic with leading coefficient greater than 1
  - ◇ Factoring a product of a quadratic trinomial and a monomial
  - ◇ Factoring a difference of squares
  - ◇ Factoring a polynomial by grouping: Problem type 1
- ◆ Quadratic Equations (11 topics)
  - ◇ Solving an equation written in factored form
  - ◇ Finding the roots of a quadratic equation with leading coefficient 1
  - ◇ Finding the roots of a quadratic equation with leading coefficient greater than 1
  - ◇ Solving a quadratic equation needing simplification
  - ◇ Solving a quadratic equation using the square root property: Exact answers, basic
  - ◇ Completing the square
  - ◇ Applying the quadratic formula: Exact answers
  - ◇ Discriminant of a quadratic equation
  - ◇ Solving a word problem using a quadratic equation with rational roots
  - ◇ Solving a word problem using a quadratic equation with irrational roots
  - ◇ Solving a quadratic inequality written in factored form
- Lines and Systems (33 topics)
  - ◆ Ordered Pairs (3 topics)
    - ◇ Plotting a point in the coordinate plane
    - ◇ Finding a solution to a linear equation in two variables
    - ◇ Determining whether given points lie on one, both, or neither of 2 lines given equations
  - ◆ Graphing Lines (5 topics)
    - ◇ Graphing a line given its x– and y–intercepts
    - ◇ Graphing a line given its equation in slope–intercept form
    - ◇ Graphing a line given its equation in standard form
    - ◇ Graphing a line through a given point with a given slope
    - ◇ Graphing a vertical or horizontal line
  - ◆ Equations of Lines (13 topics)
    - ◇ Finding the y–intercept of a line given its equation
    - ◇ Finding x– and y–intercepts of a line given the equation: Advanced
    - ◇ Finding slope given the graph of a line on a grid
    - ◇ Finding slope given two points on the line
    - ◇ Finding the slope of a line given its equation
    - ◇ Writing an equation of a line given the y–intercept and another point
    - ◇ Writing the equation of a line given the slope and a point on the line
    - ◇ Writing the equation of the line through two given points

- ◇ Finding slopes of lines parallel and perpendicular to a line given in the form  $Ax + By = C$
- ◇ Writing equations of lines parallel and perpendicular to a given line through a point
- ◇ Writing an equation and drawing its graph to model a real–world situation: Advanced
- ◇ Application problem with a linear function: Finding a coordinate given the slope and a point
- ◇ Application problem with a linear function: Finding a coordinate given two points
- ◆ Graphing Linear Inequalities (3 topics)
  - ◇ Graphing a linear inequality in the plane: Standard form
  - ◇ Graphing a linear inequality in the plane: Vertical or horizontal line
  - ◇ Graphing a linear inequality in the plane: Slope–intercept form
- ◆ Systems of Linear Equations (9 topics)
  - ◇ Graphically solving a system of linear equations
  - ◇ Solving a system of linear equations using substitution
  - ◇ Solving a system of linear equations using elimination with multiplication and addition
  - ◇ Solving a word problem involving a sum and another basic relationship using a system of linear equations
  - ◇ Solving a value mixture problem using a system of linear equations
  - ◇ Solving a distance, rate, time problem using a system of linear equations
  - ◇ Solving a percent mixture problem using a system of linear equations
  - ◇ Interpreting the graphs of two functions
  - ◇ Graphing a system of two linear inequalities: Basic
- Functions and Graphs (29 topics)
  - ◆ Sets, Relations, and Functions (9 topics)
    - ◇ Union and intersection of finite sets
    - ◇ Set builder and interval notation
    - ◇ Identifying functions from relations
    - ◇ Vertical line test
    - ◇ Evaluating functions: Linear and quadratic or cubic
    - ◇ Evaluating functions: Absolute value, rational, radical
    - ◇ Evaluating a piecewise–defined function
    - ◇ Variable expressions as inputs of functions: Problem type 1
    - ◇ Domain and range from ordered pairs
  - ◆ Graphs and Transformations (16 topics)
    - ◇ Finding intercepts of a nonlinear function given its graph
    - ◇ Finding local maxima and minima of a function given the graph
    - ◇ Finding zeros of a polynomial function written in factored form
    - ◇ Domain and range from the graph of a continuous function
    - ◇ Writing an equation for a function after a vertical translation
    - ◇ Writing an equation for a function after a vertical and horizontal translation
    - ◇ Translating the graph of a function: One step
    - ◇ Translating the graph of a function: Two steps
    - ◇ Transforming the graph of a function by reflecting over an axis
    - ◇ Transforming the graph of a function by shrinking or stretching
    - ◇ Finding the  $x$ –intercept(s) and the vertex of a parabola
    - ◇ Graphing a parabola of the form  $y = ax^2$
    - ◇ Graphing a parabola of the form  $y = (x-h)^2 + k$
    - ◇ Graphing a parabola of the form  $y = ax^2 + bx + c$ : Integer coefficients
    - ◇ Graphing a cubic function of the form  $y = ax^3$
    - ◇ Graphing an absolute value equation in the plane: Advanced
  - ◆ Combining Functions; Composite Functions; Inverse Functions (4 topics)
    - ◇ Sum, difference, and product of two functions
    - ◇ Quotient of two functions: Basic
    - ◇ Composition of two functions: Basic
    - ◇ Inverse functions: Linear, discrete

- Rational Expressions (27 topics)
  - ◆ Rational Expressions (19 topics)
    - ◇ Domain of a rational function: Excluded values
    - ◇ Simplifying a ratio of polynomials: Problem type 1
    - ◇ Simplifying a ratio of polynomials: Problem type 2
    - ◇ Simplifying a ratio of multivariate polynomials
    - ◇ Multiplying rational expressions involving multivariate monomials
    - ◇ Multiplying rational expressions involving quadratics with leading coefficients of 1
    - ◇ Dividing rational expressions involving multivariate monomials
    - ◇ Introduction to the LCM of two monomials
    - ◇ Adding rational expressions with common denominators and binomial numerators
    - ◇ Adding rational expressions with different denominators:  $ax$ ,  $bx$
    - ◇ Adding rational expressions with different denominators:  $x+a$ ,  $x+b$
    - ◇ Complex fraction without variables: Problem type 1
    - ◇ Complex fraction without variables: Problem type 2
    - ◇ Complex fraction involving multivariate monomials
    - ◇ Complex fraction: GCF and quadratic factoring
    - ◇ Complex fraction made of sums involving rational expressions
    - ◇ Dividing a polynomial by a monomial: Univariate
    - ◇ Polynomial long division: Problem type 1
    - ◇ Polynomial long division: Problem type 2
  - ◆ Rational Equations (6 topics)
    - ◇ Solving a rational equation that simplifies to linear: Denominator  $x$
    - ◇ Solving a rational equation that simplifies to linear: Denominator  $x+a$
    - ◇ Solving a rational equation that simplifies to linear: Unlike binomial denominators
    - ◇ Solving a rational equation that simplifies to linear: Denominators  $a$ ,  $x$ , or  $ax$
    - ◇ Solving a rational equation that simplifies to quadratic: Binomial denominators, constant numerators
    - ◇ Solving a rational equation that simplifies to quadratic: Binomial denominators and numerators
  - ◆ Variation (2 topics)
    - ◇ Word problem on direct variation
    - ◇ Word problem on inverse variation
- Radical Expressions (26 topics)
  - ◆ Radical Functions (2 topics)
    - ◇ Domain of a square root function: Advanced
    - ◇ Graphing a square root function
  - ◆ Radical Expressions (16 topics)
    - ◇ Square root of a rational perfect square
    - ◇ Cube root of an integer
    - ◇ Simplifying the square root of a whole number less than 100
    - ◇ Square root of a perfect square monomial
    - ◇ Simplifying a radical expression with an even exponent
    - ◇ Simplifying a radical expression with two variables
    - ◇ Simplifying a higher root of a whole number
    - ◇ Simplifying a higher radical expression: Multivariate
    - ◇ Square root addition or subtraction
    - ◇ Simplifying a sum or difference of radical expressions: Multivariate
    - ◇ Square root multiplication: Advanced
    - ◇ Simplifying a product of radical expressions: Multivariate
    - ◇ Simplifying a product involving square roots using the distributive property: Advanced
    - ◇ Special products of radical expressions: Conjugates and squaring
    - ◇ Rationalizing the denominator of a radical expression
    - ◇ Rationalizing the denominator of a radical expression using conjugates
  - ◆ Rational Exponents (5 topics)

- ◇ Converting between radical form and exponent form
- ◇ Rational exponents: Non–unit fraction exponent with a whole number base
- ◇ Rational exponents: Negative exponents and fractional bases
- ◇ Rational exponents: Products and quotients with negative exponents
- ◇ Rational exponents: Powers of powers with negative exponents
- ◆ Radical Equations (3 topics)
  - ◇ Solving a radical equation that simplifies to a linear equation: One radical, basic
  - ◇ Solving a radical equation that simplifies to a linear equation: Two radicals
  - ◇ Solving a radical equation that simplifies to a quadratic equation: One radical
- Geometry (25 topics)
  - ◆ Perimeter, Area, and Volume (17 topics)
    - ◇ Perimeter of a square or a rectangle
    - ◇ Area of a square or a rectangle
    - ◇ Area of a piecewise rectangular figure
    - ◇ Finding a side length given the perimeter and side lengths with variables
    - ◇ Finding the side length of a rectangle given its perimeter or area
    - ◇ Finding the perimeter or area of a rectangle given one of these values
    - ◇ Area of a parallelogram
    - ◇ Area of a triangle
    - ◇ Circumference and area of a circle
    - ◇ Perimeter involving rectangles and circles
    - ◇ Area involving inscribed figures
    - ◇ Volume of a rectangular prism
    - ◇ Volume of a cylinder
    - ◇ Surface area of a cube or a rectangular prism
    - ◇ Surface area of a cylinder: Exact answers in terms of pi
    - ◇ Similar polygons
    - ◇ Indirect measurement
  - ◆ Angles (3 topics)
    - ◇ Solving equations involving vertical angles
    - ◇ Finding an angle measure of a triangle given two angles
    - ◇ Finding an angle measure for a triangle with an extended side
  - ◆ Coordinate Geometry (5 topics)
    - ◇ Pythagorean Theorem
    - ◇ Distance between two points in the plane: Exact answers
    - ◇ Graphing a circle given its equation in standard form
    - ◇ Graphing a circle given its equation in general form
    - ◇ Writing an equation of a circle given its center and a point on the circle
- Other Topics Available(\*) (58 additional topics)
  - ◆ Real Numbers (6 topics)
    - ◇ Fractional part of a circle
    - ◇ Finding the percentage increase or decrease: Advanced
    - ◇ Word problem on unit rates associated with ratios of whole numbers: Decimal answers
    - ◇ Exponents and integers: Problem type 2
    - ◇ Properties of addition
    - ◇ Properties of real numbers
  - ◆ Equations and Inequalities (6 topics)
    - ◇ Solving an equation to find the value of an expression
    - ◇ Solving a decimal word problem using a linear equation with the variable on both sides
    - ◇ Solving a fraction word problem using a linear equation with the variable on both sides
    - ◇ Solving a word problem with three unknowns using a linear equation

- ◇ Writing a multi–step inequality for a real–world situation
- ◇ Solving a decimal word problem using a linear inequality with the variable on both sides
- ◆ Exponents and Polynomials (13 topics)
  - ◇ Evaluating expressions with exponents of zero
  - ◇ Ordering numbers with positive exponents
  - ◇ Ordering numbers with negative exponents
  - ◇ Power, product, and quotient rules with negative exponents
  - ◇ Multiplying and dividing numbers written in scientific notation
  - ◇ Degree of a multivariate polynomial
  - ◇ Simplifying a sum or difference of three univariate polynomials
  - ◇ Factoring with repeated use of the difference of squares formula
  - ◇ Factoring a sum or difference of two cubes
  - ◇ Solving an equation that can be written in quadratic form: Problem type 1
  - ◇ Solving a quadratic equation using the square root property: Exact answers, advanced
  - ◇ Solving a quadratic equation by completing the square: Exact answers
  - ◇ Solving a quadratic inequality
- ◆ Lines and Systems (5 topics)
  - ◇ Writing the equations of vertical and horizontal lines through a given point
  - ◇ Solving a 3x3 system of linear equations: Problem type 1
  - ◇ Solving a 2x2 system of linear equations that is inconsistent or consistent dependent
  - ◇ Solving a tax rate or interest rate problem using a system of linear equations
  - ◇ Solving a word problem using a 3x3 system of linear equations: Problem type 1
- ◆ Functions and Graphs (6 topics)
  - ◇ Set builder notation
  - ◇ Finding inputs and outputs of a function from its graph
  - ◇ Finding where a function is increasing, decreasing, or constant given the graph: Interval notation
  - ◇ Classifying the graph of a function
  - ◇ Horizontal line test
  - ◇ Determining whether two functions are inverses of each other
- ◆ Rational Expressions (6 topics)
  - ◇ Ordering fractions with variables
  - ◇ Dividing rational expressions involving quadratics with leading coefficients of 1
  - ◇ Least common multiple of two monomials
  - ◇ Adding rational expressions with multivariate monomial denominators: Advanced
  - ◇ Writing an equation that models variation
  - ◇ Word problem on combined variation
- ◆ Radical Expressions (8 topics)
  - ◇ Rationalizing a denominator: Quotient involving higher radicals and monomials
  - ◇ Using  $i$  to rewrite square roots of negative numbers
  - ◇ Simplifying a product and quotient involving square roots of negative numbers
  - ◇ Adding or subtracting complex numbers
  - ◇ Multiplying complex numbers
  - ◇ Dividing complex numbers
  - ◇ Simplifying a power of  $i$
  - ◇ Solving a quadratic equation with complex roots
- ◆ Geometry (8 topics)
  - ◇ Areas of rectangles with the same perimeter
  - ◇ Finding the radius or the diameter of a circle given its circumference
  - ◇ Circumference ratios
  - ◇ Area involving rectangles and circles
  - ◇ Word problem involving the area between two concentric circles
  - ◇ Word problem involving the rate of filling or emptying a cylinder
  - ◇ Midpoint of a line segment in the plane

◇ Writing an equation of a circle given the endpoints of a diameter

**Other Topics Available** *By default, these topics are NOT included in the course, but can be added using the content editor in the Teacher Module.*